



Florida Power & Light Company, 6501 S. Ocean Drive, Jensen Beach, FL 34957

June 1, 2009

L-2009-120  
10 CFR 50.73

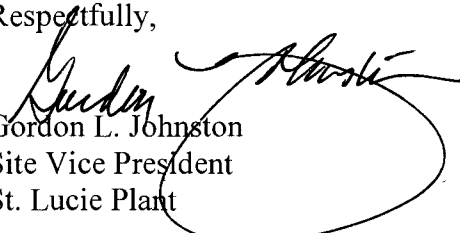
U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

Re: St. Lucie Unit 2  
Docket No. 50-389  
Reportable Event: 2009-002  
Date of Event: April 1, 2009

Ingress of Algae Results in Manual Trip of St. Lucie Unit 2

The attached Licensee Event Report 2009-002 is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Respectfully,



Gordon L. Johnston  
Site Vice President  
St. Lucie Plant

GLJ/dlc

Attachment

IE22  
NRR

<b>NRC FORM 366</b> (9-2007)		<b>U.S. NUCLEAR REGULATORY COMMISSION</b>		APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010																																					
<b>LICENSEE EVENT REPORT (LER)</b>				Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.																																					
<b>1. FACILITY NAME</b> St. Lucie Unit 2			<b>2. DOCKET NUMBER</b> 05000389		<b>3. PAGE</b> 1 of 4																																				
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<b>13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT</b> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th style="width:12%;">CAUSE</th> <th style="width:12%;">SYSTEM</th> <th style="width:12%;">COMPONENT</th> <th style="width:12%;">MANU-FACTURER</th> <th style="width:12%;">REPORTABLE TO EPIX</th> <th style="width:12%;">CAUSE</th> <th style="width:12%;">SYSTEM</th> <th style="width:12%;">COMPONENT</th> <th style="width:12%;">MANU-FACTURER</th> <th style="width:12%;">REPORTABLE TO EPIX</th> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;">CC</td> <td style="text-align: center;">COND</td> <td style="text-align: center;">-</td> <td style="text-align: center;">YES</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>						CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	B	CC	COND	-	YES																					
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<b>ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)</b> <p>On April 1, 2009, St. Lucie Unit 2 was operating in Mode 1 at 94% power when Unit 2 experienced a continuing reduction of condenser vacuum and an increase in the debris filter system (DFS) differential pressure resulting from the ingress of algae from the Atlantic Ocean into the intake canal. Previous attempts to control the debris were unsuccessful and Unit 2 was manually tripped at 92% power at 18:05 in accordance with Off-Normal Operating Procedure 2-0620030, "Circulating Water System". All systems functioned normally, and the plant was stabilized at normal operating temperature and pressure. A non-emergency notification was made to the NRC at 20:51, April 1, 2009. There was no impact on Unit 1.</p> <p>The loss of vacuum was caused by a greater than expected influx of a unique strain of algae which challenged the debris filter screening system and current design of the weir pit which allows recirculation of debris back into the intake canal. Corrective actions taken include a daily Staff Biologists' analysis of biota entering the intake canal with reports provided to the Shift Manager, actions to review weir design, preventive maintenance and cleaning of the weir pit, and development of a new procedure for Intake Intrusion Mitigation.</p>																																									

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
St. Lucie Unit 2	05000389	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	Page 2 of 4
		2009	- 002	- 00	

**NARRATIVE****Description of the Event**

April 1, 2009, St. Lucie Unit 2 experienced a high ingress of algae. All traveling water screens (TWS) [EIIS:SCN], circulating, and intake cooling water debris filters [EIIS:FLT] were operating continuously to control differential pressures across the filters and downstream equipment caused by the debris. Steps were taken to down power the Unit to secure the 2A1 circulating water pump (CWP) from service. During this time it was identified that the differential pressure on the 2A2 circulating water debris filter screens (DFS) [EIIS:SCN] had exceeded the administrative limits of 200 inches of water. Given the circumstances and the degrading conditions, the decision was made to manually trip the reactor while at 92% power. Subsequently, the auxiliary feedwater actuation system (AFAS) automatically initiated on low steam generator level. All systems functioned normally, the plant was stabilized at normal operating temperature and pressure and a non-emergency notification was made to the NRC.

**Cause of the Event**

The loss of vacuum was caused by a greater than expected influx of a unique strain of algae which challenged the debris filter screening system and weir pit design.

As the ingress of algae began to accumulate on the screen wash pumps (SWP) strainers, the 2A and 2B SWP were taken out of service to backwash the strainers to alleviate the accumulation. The screen wash header flow was isolated to all Unit 2 traveling water screens while SS-21-2B strainer was backwashed. During this time debris loading on all Unit 2 traveling water screens began to accumulate to severe levels.

Changes to the original design of the weir pit for Units 1 and 2 contributed to the recirculation of removed debris from the traveling water screens to re-circulate back to the intake canal. The traveling screen debris flow starts in the trash trough and then flows into the trash box for removal. At the time of the ingress the trash box had filled to the spillway level with debris. Without the capability to accumulate debris in the trash box, debris flows directly into the trash pit. A basket strainer is often used to aid in the removal of debris from the trash pit but was not installed during this event.

The design of the weir pit has two 28" x 16" window openings that function to equalize the water level in the intake canal and the pit. The recent influx of algae was "neutrally-buoyant", unlike previous influx of debris, and was distributed evenly throughout the water column. This characteristic allowed the debris to recirculate back through the window openings in the weir pit and be pulled back into the traveling screens.

St. Lucie has experienced various unit down powers, equipment failures, and high ingress of sea grass events that have impacted electric generation and system reliability at the station over the past several years. Most sea grass and jelly fish events at St. Lucie station occurred during the mid to late summer season. The

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**NARRATIVE**

Unit 2 manual plant trip on April 1, 2009 is an outlier to this trend.

**Analysis of the Event**

This event is reportable under the requirements of 10 CFR 50.72(b) (2) (iv) (A) due to manual reactor protection system (RPS) actuation, and under 10 CFR 50.72(b) (3) (iv) (A) due to PWR auxiliary feedwater system actuation (AFSA).

The plant response to the reactor trip resulted in all control rods being fully inserted, no power operated relief valves (PORVs) opened, the reactor coolant system (RCS) heat removal was maintained with main feedwater and steam bypass control systems, and the auxiliary feedwater actuation system (AFAS) was automatically initiated on low steam generator level. All systems functioned normally, and the plant was stabilized at normal operating temperature and pressure.

Prior to the trip, reactor power had been reduced to 94% in order to secure the 2A1 CWP. It was then identified that 2A2 circulating water debris filter differential pressure was above administrative limits of 200 inches water. While the station was preparing to reduce circulating water flow on the 2A2 circulating water pump, the unit began losing condenser vacuum and the reactor was manually tripped at 92% power. All systems functioned normally, and the plant was stabilized at normal operating temperature and pressure.

In previous site evaluations and in St. Lucie's original response to SOER 07-2, "Intake Cooling Water Blockage", it had been determined that most sea grass and jelly fish events at the St. Lucie Plant occurred during the mid to late summer season.

Marine life macro-fouling across the southeastern Florida coast is expected to increase due to higher nutrient solutions being discharged from various sources across the coast.

**Analysis of Safety Significance**

All safety related systems functioned as designed. The event was bounded by the analysis described in Section 15.2.3, "Loss of Condenser Vacuum". The actual plant response was more conservative than that described in the analysis given the reactor and turbine were tripped manually before reaching automatic set points, the plant was not at full power when the events occurred and a complete loss of condenser cooling did not occur, thus the steam bypass control system was able to remove heat from the steam generators. Given the response of the plant and actions taken, the health and safety of the public was not affected by this event.

**Corrective Actions**

Corrective actions taken include a daily Staff Biologists' analysis of biota entering the intake canal with reports provided to the Shift Manager and actions to review weir design, preventive maintenance pit cleaning and maintenance practices, and development of a procedure for Intake Intrusion Mitigation for monitoring, measuring and combating of intake intrusion events.

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**NARRATIVE**

**Similar Events**

St. Lucie has experienced similar plant events as a result of intake sea grass and jelly fish intrusion and/or related equipment failures. In previous site evaluations and in PSL's original response to SOER 07-2, "Intake Cooling Water Blockage", it had been determined that most sea grass and jelly fish events at the station occurred during the mid to late summer season. Additionally, the type and amount of sea grass experienced during this event had different characteristics which created additional cleaning challenges not previous experienced.

A review of nuclear industry events also identified several similar failures associated with traveling water screens and intake system blockage/intrusion resulting from algae and intake debris.

**Failed Components**

NA